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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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| In re application of: | Appeal No. |
| Pierre HOLZSCHUH et al. | Conf. 2245 |
| Application No. 10/765,123 | Group 1794 |
| Filed January 28, 2004 | Examiner K. Mahafkey |

PROCESS FOR THE PRODUCTION OF ALIMENTARY SMOKE BY PYROLYSIS, THE USE OF MEANS PARTICULARLY ADAPTED TO SAID PROCESS, SMOKE AND SMOKED FOODSTUFFS OBTAINED

# APPEAL BRIEF

MAY IT PLEASE YOUR HONORS: August 18, 2008

(i) **Real Party in Interest**

The real party in interest in this appeal is the Assignee, SOFRAL SOCIETE FRANCAISE D'ALIMENTATION S.A.(Societe Anonyme) of Illkirch Graffenstaden, France.

(ii) **Related Appeals and Interferences**

Neither the appellant, appellant's legal representative nor the assignee know of any other prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(iii) **Status of the Claims**

Claims 1, 2, 4-15, and 17-24 are pending, from whose final rejection this appeal is taken. Claims 3 and 16 were cancelled.

iv) **Status of Amendments**

There are no outstanding amendments. The claims have not been amended since the October 30, 2007 supplemental amendment. These claims were finally rejected by the Official Action mailed January 18, 2008 (the "Official Action"). The claims are as set forth in the Claims Appendix.

(v) **Summary of Claimed Subject Matter**

In general terms, claims 1, 17, 18, and 19 are the independent claims directed to a process for the production of a smoke product obtained by pyrolysis of an organic material. Claim 13 is directed to a liquid smoke product, obtained by the process of claim 1, Claim 14 is directed to liquid smoke obtained by condensation of smoke according to claim 13, and claim 15 is directed to a foodstuff smoked with smoke according to claim 13.

Specifically, claim 1 is directed to a process for the production of a smoke product, said smoke product being

obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed in a pyrolysis reactor comprising a substantially hermetically sealed heatable chamber containing at least one rotatable heated endless screw, wherein said heated rotatable screw comprises a heating device that supplies calories to elevate the temperature of the organic material, said material being introduced at one end of said at least one screw,

*(See, e.g., page 5, lines 4-15 in light of page 7, lines 28-31 and page 9, lines 19-29.)*

- heating said organic material in said chamber to a temperature between 300°C and 400°C to pyrolyze said organic material and said organic material moves through said heatable chamber under the influence of rotation of said at least one screw, and

*(Page 5, lines 16-20)*

- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

*(Page 5, lines 21-22)*

Claim 13 is directed to a liquid smoke product, obtained by the process according to claim 1, wherein said

liquid smoke comprises a volume content of benzopyrene of at most 10 ppb and a volume content of benzoanthracene of at most 20 ppb.

*(See, e.g., page 6, lines 1-9 in view of page 5, lines 4-22)*

Claim 17 is directed to a process for the production of a smoke product by pyrolysis of an organic material, comprising:

- introducing said organic material to be pyrolyzed in a pyrolysis reactor comprising a substantially hermetically sealed heatable chamber containing at least one rotatable heated endless screw, wherein said rotatable heated endless screw comprises a heating device that supplies calories to elevate the temperature of the organic material to 300°C to 380°C, said material being introduced at one end of said screw,

*(See, e.g., page 5, lines 4-17 in light of page 7, lines 28-31, page 9, lines 19-29 and Example 1, lines 15-21 on page 14.)*

- heating said organic material with said at least one rotatable heated endless screw in said chamber at a temperature of 300°C to 380°C to pyrolyze said organic material and said organic material moves through said heatable chamber under the influence of rotation of

said at least one screw, and

*(Page 5, lines 16-20)*

- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

*(Page 5, lines 21-22)*

Claim 18 is directed to process for the production of a smoke product obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed at one end of at least one rotatable heated endless screw, wherein said at least one rotatable heated endless screw is in a substantially hermetically sealed heatable chamber of a pyrolysis reactor, and wherein said rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw,

*(See, e.g., page 5, lines 4-15 in light of page 7, lines 28-31, page 9, lines 19-29)*

- heating said organic material with said rotatable heated endless screw in said chamber at a temperature of 300°C to 400°C to pyrolyze said organic material as said organic material moves through said heatable chamber under the influence of rotation of said at

least one screw, and

*(Page 5, lines 16-20)*

- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

*(Page 5, lines 21-22)*

Claim 19 is directed to a process for the production of a smoke product obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed at one end of at least one rotatable heated endless screw, wherein said at least one rotatable heated endless screw is in a substantially hermetically sealed heatable chamber of a pyrolysis reactor, and wherein said rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw,

*(See, e.g., page 5, lines 4-15 in light of page 7, lines 28-31, page 9, lines 19-29)*

- heating said organic material with said rotatable heated endless screw in said chamber at a temperature of 300°C to 400°C as said organic material moves through the substantially hermetically sealed heatable

chamber under the influence of rotation of said at least one screw,

*(Page 5, lines 16-20)*

- recovering a smoke product from the pyrolyzed organic material, wherein said smoke product is a liquid smoke comprising a volume content of benzopyrene of at most 10 ppb and a volume content of benzoanthracene of at most 20 ppb, and

*(Page 6, lines 5-9)*

- removing the consumed organic material from the other end of said at least one screw.

*(Page 5, lines 21-22)*

(vi) **Grounds of Rejection to be Reviewed on Appeal**

There are three grounds of rejection to be reviewed on appeal, namely:

1) Whether claim 21 was properly rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

2) Whether claims 1, 2, 4, 6-15, 18-21, 23 and 24 were properly rejected under 35 U.S.C. §103(a) as being unpatentable over UNDERWOOD et al. U.S. 4,876,108 ("UNDERWOOD") in view of the combination of LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007 and WEISSMAN U.S. 3,012,124 ("WEISSMAN").

3) Whether claims 5 and 22 were properly rejected

under 35 U.S.C. §103(a) as being unpatentable over UNDERWOOD et al. U.S. 4,876,108 ("UNDERWOOD") in view of the combination of LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007 and WEISSMAN U.S. 3,012,124 ("WEISSMAN"), further in view of WISTREICH et al. U.S. 3,875,314 ("WISTREICH").

4) Whether claims 1, 17, 18 and 19 were properly rejected under 35 U.S.C. §103(a) as being unpatentable over GRUHL U.S. 4,992,404 ("GRUHL") and LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007.

(vii) **Arguments**

Rejection of claim 21 under 35 U.S.C. §112, second paragraph, as being indefinite.

The position taken by the Examiner is that the claim is unclear as to which condensation devices are suitable and as to who determines the suitability.

However, the present specification describes in a non-limiting example, that a suitable condensation device is "a conventional refrigerated condensation column or any analogous device well known to those skilled in the art" may be used. See, e.g., page 10, lines 7-13. Thus, it is clear which devices are suitable, and who determines their suitability.

Reversal of this indefiniteness rejection is accordingly respectfully requested.

<u>Rejection of claims 1, 2, 4, 6-15, 18-21, 23 and 24 under 35 U.S.C. §103(a) as being unpatentable over UNDERWOOD et al. U.S. 4,876,108 ("UNDERWOOD") in view of the combination of LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007 and WEISSMAN U.S. 3,012,124 ("WEISSMAN").</u>

<u>Claims 1, 2, 4, and 6-12</u>

UNDERWOOD is offered for teaching a pyrolysis reactor with a heating and mixing device to produce an aqueous wood smoke solution from wood or cellulose for flavouring foodstuffs. The heating is carried out in an oxygen starved atmosphere, and at a temperature <u>between</u> 400°C and 650°C.

The Examiner recognizes that UNDERWOOD fails to teach a rotatable heated endless screw comprising a heating device as recited in independent claim 1.

However, the Examiner does not recognize that UNDERWOOD also fails to disclose or suggest other features of claim 1, such as heating <u>between</u> 300°C and 400°C and introducing material at one end of the screw, while both removing consumed material and recovering smoke at the other end of the screw.

LEPEZ is offered for teaching a thermal device in combination with a mixing apparatus, which eliminates the need of an onerous bulky system.

WEISSMAN is offered for teaching a smoke generator for generating smoke from hard wood chips. The trough of the generator is heated by electrical resistance elements and includes an Archimedean screw to convey the chips through the trough.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to utilize a rotatable heated endless screw, for mixing in a pyrolysis process as taught by WEISMANN because WEISMANN teaches that screw systems provide increased operating efficiency. The Examiner also states that it would have been further obvious to utilize a rotatable heated endless crew comprising an electrical heating device that passes electric current through the screw, as LEPEZ teaches that heated screw systems provide for a less bulky and less onerous system.

However, the proposed combination fails to render obvious independent claim 1 for at least two reasons:

I. The proposed modification would destroy the intended purpose of UNDERWOOD.

UNDERWOOD discloses <u>fast</u> or <u>flash</u> pyrolysis methods performed at high temperatures, e.g., <u>above</u> 400°C, combined with short residence times, e.g., 3 seconds at

most. The methods are carried out in an oxygen starved environment using vacuum pyrolysis apparatus, a fluidized bed reactor system, or a rapid thermal processing system. UNDERWOOD discloses that the advantages of these methods over conventional methods include a higher smoke yield and a very low level of benzopyrene, a known carcinogen. See, e.g., column 2, lines 54-60, column 4, lines 26-40, the paragraph bridging columns 6 and 7, and column 7, lines 14-42.

UNDERWOOD states that conventional pyrolysis methods are slow thermal reactions and occur at moderate temperatures, e.g., an average reactor temperature of 420°C, where the heater may be at 600°C and the bulk material is only 250°C. See, e.g., column 1, lines 51 to column 2, lines 2, and column 4, lines 26-40.

WEISMANN discloses a conventional smoke generator, which is utilizes air and is operated at temperatures far below those of the inferior conventional temperatures disclosed by UNDERWOOD, e.g., 200-220°F, or about 93-104°C. Indeed, WEISMANN avoids approaching 300 °F, or about 149°C, as this is the temperature at which the wood is combustible. See, e.g., column 2, lines 67-71 and column 5, lines 24-35.

LEPEZ disclose an apparatus limited to low temperature treatments, such as drying and roasting. The construction of the apparatus, which includes plastic

materials, and the low temperature treatments suggest that the apparatus is not suitable for fast or flash pyrolysis.

Thus, one of ordinary skill in the art would have been strongly discouraged from modifying UNDERWOOD as proposed, as the rotatable screw mixer of WEISMANN, with or without modification from LEPEZ, operates in a manner contrary to the requirements of UNDERWOOD. That is, the screw requires (i) low temperatures and (ii) an air supply. Indeed, there would have been no expectation of success, as UNDERWOOD discloses that <u>without</u> fast or flash methods in an oxygen starved environment, one obtains lower smoke yields and higher levels benzopyrene.

II. The proposed combination fails to teach the claimed invention.

Neither WEISMANN nor LEPEZ remedy the shortcomings of UNDERWOOD for reference purposes.

WEISMANN solely discloses temperatures less than those claimed for a heating step in producing a smoke product.

While WEISAMANN does disclose introducing material at one end of the screw (hopper 80 in Figure 3), and collecting ash the other end of the screw (cut out 70 in Figure 3), WEISMANN fails to suggest recovering smoke at the location claimed, or even recovering smoke. Instead, smoke

is released via a smoke stack between the two ends of the screw (stack 53 via smoke take-off opening 51 in Figure 3), and air is brought into the apparatus (at plate 57 of Figure 3) at the end of the screw where the ash is collected. See, e.g., column 3, lines 56-72 and column 2, lines 48-71.

LEPEZ is silent as to a specific temperature used for roasting and drying, but suggests a temperature lower than UNDERWOOD as LEPEZ also utilizes plastic material. LEPEZ also fails to offer any guidance for recovering smoke.

Thus, the combination cannot teach, or even suggest (i) heating between 300°C and 400°C and (ii) material being introduced at one end of a screw, and removing consumed organic material and recovering the smoke from the other end, as required by claim 1.

Reversal of this rejection of claims 1, 2, 4, and 6-12 is respectfully requested.

<u>Claim 13-15</u>

Claim 13 is directed to liquid smoke product obtained by the process of claim 1, and claims 14 and 15 depend from claim 13.

The Examiner offers UNDERWOOD, LEPEZ and WEISMANN for the same reasons discussed above with respect to claims 1, 2, 4, and 6-12.

However, as stated with respect to claims 1, 2, 4,

and 6-12, UNDERWOOD discloses that one of the advantages of fast or flash pyrolysis in an oxygen starved atmosphere is that low levels of benzopyrene are produced. At the end of the process UNDERWOOD is able to obtain below 5ppb benzopyrene, but fails to disclose a level of benzoanthracene, as recited in claim 13. See, e.g., column 4, lines 1-4.

WEISMANN discloses much lower smoke temperatures than UNDERWOOD, i.e., 200-220°F, or about 93-104°C, and requires air.

LEPEZ discloses roasting and drying temperatures.

Thus, one of ordinary skill in the art would have been strongly discouraged from combining the publications as suggested, as neither WEISMANN nor LEPEZ suggest equipment or methods that operate in an oxygen starved environment and at a temperature high enough to limit the generation of benzopyrene to below 5ppb as required by UNDERWOOD.

Moreover, even if one were to combine the publications as suggested, the combination fails to teach the claimed invention. UNDERWOOD discloses fast or flash pyrolysis in an oxygen starved environment to obtain a level of benzopyrene of below 5 ppb, but the neither WEISMANN nor LEPEZ suggest apparatus for fast or flash pyrolysis in an oxygen starved environment. Additionally, none of the publications even disclose benzoanthracene of at most 20

ppb, as recited in claim 13.

Reversal of this rejection of claim 13, as well as claims 14 and 15, is respectfully requested.

Claim 18

The Examiner offers UNDERWOOD, LEPEZ and WEISMANN for the same reasons discussed above with respect to claims 1, 2, 4, and 6-12. However, claim 18 differs from claim 1 in that claim 18 further recites that the rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw.

LEPEZ is offered for teaching utilizing such an electric current in combination with roasting or drying, but fails to teach that such a feature is capable for achieving the high temperatures required by UNDERWOOD.

Thus, as discussed previously with respect to claim 1, one would have been strongly discouraged to modify UNDERWOOD as proposed, as the rotatable screw operates contrary to the requirements of UNDERWOOD. That is, the rotatable screw requires (i) low temperatures and (ii) an air supply. Indeed, there would have been no expectation of success, as UNDERWOOD discloses that without fast or flash methods in an oxygen starved environment, one obtains lower smoke yields and higher levels benzopyrene.

Moreover, for the reasons discussed above with respect to claim 1, the combination cannot teach, or even suggest (i) heating between 300°C and 400°C and (ii) material being introduced at one end of a screw, and removing consumed organic material and recovering the smoke from the other end, as required by claim 18.

Reversal of this rejection of claim 18 is respectfully requested.

Claim 19-21, 23 and 24

The Examiner relies on UNDERWOOD, LEPEZ and WEISMANN for the same reasons discussed above with respect to claims 1, 2, 4, and 6-12.

However, while claim 19 is similar to claim 1, claim 19 differs from claim 1 in that (i)the rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw, (ii) the recovered smoke product comprises at most 10 ppb of benzopyrene and at most 20 ppb benzoanthracene, and (iii) the location of recovering the smoke product is not explicitly claimed.

As discussed previously with respect to claim 1, one would have been strongly discouraged to modify UNDERWOOD as proposed, as the rotatable screw mixer of WEISMANN, with or without modification from LEPEZ, operates in a manner

contrary to UNDERWOOD: (i) at low temperatures and (ii) with an air supply. There would have been no expectation of success, as UNDERWOOD discloses that without the fast or flash operating conditions, one obtains lower smoke yields and higher levels benzopyrene.

Moreover, as also discussed above with respect to claim 1, the combination cannot teach, or even suggest heating between 300°C and 400°C as recited in claim 19.

Furthermore, UNDERWOOD requires fast or flash conditions in an oxygen starved environment to obtain a level of benzopyrene of below 5 ppb, but neither WEISMANN nor LEPEZ suggest operating parameters that would suggest that the level would even be possible. Further, none of the publications even disclose benzoanthracene of at most 20 ppb, as recited in claim 19.

Reversal of this rejection of independent claim 19 and dependent claims 20, 21, 23 and 24 is respectfully requested.

<u>Rejection of claims 5 and 22 under 35 U.S.C. §103(a) as being unpatentable over UNDERWOOD et al. U.S. 4,876,108 ("UNDERWOOD") in view of the combination of LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007 and WEISSMAN U.S. 3,012,124 ("WEISSMAN"), further in view of WISTREICH et al. U.S. 3,875,314 ("WISTREICH").</u>

UNDERWOOD, LEPEZ and WEISMANN are offered for the same reasons discussed above with respect to claims 1, 2, 4, and 6-12. The Examiner recognizes that this proposed combination fails to teach or suggest re-injecting the condensed gas back into the reactor.

WISTREICH is offered for teaching recirculating vapors and gases generated during pyrolysis in order to enhance yield.

However, regardless of the ability of WISTREICH to teach that for which it is offered, WISTREICH cannot remedy the shortcomings of UNDERWOOD or combination of UNDERWOOD, LEPEZ, and WEISMANN for reference purposes. For example, WISTREICH is also directed to a high temperature process, e.g., 600-750°C, and utilizes a vibrating tray.

Reversal of this rejection of claims 5 and 22 is respectfully requested.

<u>Rejection of claims 1, 17, 18 and 19 under 35 U.S.C. §103(a) as being unpatentable over GRUHL U.S. 4,992,404 ("GRUHL") and LEPEZ FR 2,775,621 ("LEPEZ") as translated by the USPTO July 2007</u>.

<u>Claim 1</u>

GRUHL is offered for teaching a pyrolysis process of an organic material with a screw conveyor at a temperature of 200-800°C, removing volatile products and

organic residue.

The Examiner recognizes that GRUHL fails to disclose or suggest a reactor that is substantially hermetically sealed, and that the screw comprises an electrical heating device.

However, GRUHL further fails to disclose or suggest heating material with a heated endless screw between 300°C and 400°C. GRUHL also fails to disclose or suggest the introducing material at one end of the screw, and both removing consumed material and recovering smoke at the other end of the screw, as recited in claim 1. GRUHL is also directed to producing a catalyst, not a smoked product as claimed.

LEPEZ is offered for teaching a thermal device in combination with a mixing apparatus, which eliminates the need of an onerous bulky system. However, LEPEZ solely discloses this device in combination with roasting or drying, and fails to teach that the device is capable of achieving the much higher temperatures disclosed by GRUHL, e.g., 200-800°C.

The position of the Examiner is that it would have been obvious to one of ordinary skill in the art to substantially hermetically seal the pyrolysis reactor of GRUHL to prevent the escape of the volatile products formed by GRUHL during the heating process, and it would have been

obvious to use a heating device such as that suggested by LEPEZ for a less bulky and onerous system.

However, one of ordinary skill in the art would have been discouraged from combining the thermal device used for drying and roasting coffee with a pyrolysis apparatus for forming catalysts, as the processes are unrelated. Pyrolysis is used for chemical breakdown, evidenced by the fact that GRUHL requires 200-800°C, not simple moisture removal.

Even if one were to combine the references, the proposed combination also fails to a process for producing a smoke product as claimed. GRUHL discloses a method of producing carbon-based catalysts useful in gas-solid reactions using the reactor, <u>not</u> a smoke product, and LEPEZ discloses roasted coffee. The combination also fails to teach heating material with a heated endless screw specifically between 300°C and 400°C. Furthermore, the combination fails to teach introducing organic material at one end of the screw, while both removing consumed material and recovering smoke at the other end of the screw, as recited in claim 1.

Reversal of this rejection of claim 1 is respectfully requested.

Claim 17

The Examiner offers GRUHL and LEPEZ for the same reasons discussed immediately above for claim 1.

However, claim 17 includes the similar features as claim 1, but further requires that the heating device supplies calories to elevate the temperature of the organic material to 300°C to 380°C, and heating the organic material to this temperature range.

One of ordinary skill in the art would have been discouraged from combining the thermal device used for drying and roasting coffee with a pyrolysis apparatus used for forming a catalyst, as the process are not related. Pyrolysis is used for chemical breakdown, evidenced by the fact that GRUHL requires 200-800°C, not simple moisture removal.

Moreover, the proposed combination cannot teach the features of claim 17. For example, the combination fails to teach a smoke product as claimed. The combination also fails to teach a preference for heating material with a heated screw to a temperature of 300°C to 380°C. Furthermore, the combination fails to teach introducing organic material at one end of the screw, while both removing consumed material and recovering smoke at the other end of the screw, as recited in claim 17.

Reversal of this rejection of claim 17 is

respectfully requested.

Claim 18

The Examiner offers GRUHL and LEPEZ for the same reasons discussed above with respect to claim 1.

However, claim 18 further recites that the rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw.

LEPEZ is offered for teaching this particular feature.

However, LEPEZ solely discloses this feature in combination with roasting or drying, and fails to teach that such a feature is capable of achieving the much higher temperatures disclosed by GRUHL, e.g., 200-800°C.

One of ordinary skill in the art would have been discouraged from combining the thermal device used for drying and roasting coffee with a pyrolysis apparatus for forming catalysts, as the process are unrelated. Pyrolysis is used for chemical breakdown, evidenced by the fact that GRUHL requires 200-800°C, not simple moisture removal.

Moreover, the proposed combination fails to teach a smoked product as claimed, heating material with a heated endless screw specifically between 300°C and 400°C, and introducing organic material at one end of the screw, while

both removing consumed material and recovering smoke at the other end of the screw, as recited in claim 18.

Reversal of this rejection of claim 18 is respectfully requested.

Claim 19

The Examiner offers GRUHL and LEPEZ for the same reasons discussed above with respect to claim 1.

However, while claim 19 is similar to claim 1, claim 19 differs from claim 1 in that (i)the rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw, (ii) the recovered smoke product comprises at most 10 ppb of benzopyrene and at most 20 ppb benzoanthracene, and (iii) the recovering of the smoke product is not necessarily carried out at the same end of the screw as the removing of the consumed organic material.

One of ordinary skill in the art would have been discouraged from combining the thermal device used for drying and roasting coffee with a pyrolysis apparatus, as the processes are unrelated. Pyrolysis is used for chemical breakdown, evidenced by the fact that GRUHL requires 200-800°C, not simple moisture removal.

Moreover, the proposed combination fails to a smoke product, let alone a recovered smoke product that

comprises at most 10 ppb of benzopyrene and at most 20 ppb benzoanthracene. The combination also fails to teach heating material with a heated endless screw specifically between 300°C and 400°C.

Reversal of this rejection of claim 19 is respectfully requested.

Please charge the requisite fee of $255 for filing of the Appeal Brief, to our credit card as set forth in the attached Credit Card Payment Form.

Respectfully submitted,

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(viii) **Claims Appendix**

The claims on appeal are:

1. A process for the production of a smoke product, said smoke product being obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed in a pyrolysis reactor comprising a substantially hermetically sealed heatable chamber containing at least one rotatable heated endless screw, wherein said heated rotatable screw comprises a heating device that supplies calories to elevate the temperature of the organic material, said material being introduced at one end of said at least one screw,
- heating said organic material in said chamber to a temperature between 300°C and 400°C to pyrolyze said organic material and said organic material moves through said heatable chamber under the influence of rotation of said at least one screw, and
- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

2. The process according to claim 1, wherein the organic material is preheated before being pyrolyzed.

4. The process according to claim 1, wherein the produced smoke is condensed at the outlet of the reactor in a condensation device.

5. The process according to claim 1, wherein at least one portion of the pyrolysis gas present at the outlet of the condensation device is re-injected into the reactor.

6. The process according to claim 1, wherein the pyrolysis takes place under precise control, to about 0.1%, of the volume content of oxygen in the reactor.

7. The process according to claim 1, wherein the pyrolysis takes place under precise control, to about one degree Celsius, of the temperature prevailing in said reactor.

8. The process according to claim 1, wherein the pyrolyzed organic material is essentially constituted by wood chips.

9. The process according to claim 1, wherein the pyrolyzed organic material is essentially constituted by fibers or chips of at least one substance selected from the

group consisting of wood, cellulose, any other polysaccharide and lignocellulose complex.

10. A method of producing a smoke product, comprising operating a pyrolysis reactor by the process according to claim 1 to produce a smoke product, said pyrolysis reactor comprising a substantially hermetically sealed heatable chamber containing at least one rotatable endless screw comprising a heating device that heats said screw heated by the Joule effect.

11. The method according to claim 10, wherein the product is of liquid smoke.

12. The method according to claim 10, wherein the product is of wood charcoal.

13. Liquid smoke product, obtained by the process according to claim 1, wherein said liquid smoke comprises a volume content of benzopyrene of at most 10 ppb and a volume content of benzoanthracene of at most 20 ppb.

14. Liquid smoke obtained by condensation of smoke according to claim 13.

15. Foodstuff smoked with the smoke according to claim 13.

17. A process for the production of a smoke product by pyrolysis of an organic material, comprising:

- introducing said organic material to be pyrolyzed in a pyrolysis reactor comprising a substantially hermetically sealed heatable chamber containing at least one rotatable heated endless screw, wherein said rotatable heated endless screw comprises a heating device that supplies calories to elevate the temperature of the organic material to 300°C to 380°C, said material being introduced at one end of said screw,
- heating said organic material with said at least one rotatable heated endless screw in said chamber at a temperature of 300°C to 380°C to pyrolyze said organic material and said organic material moves through said heatable chamber under the influence of rotation of said at least one screw, and
- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

18. A process for the production of a smoke product obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed at one end of at least one rotatable heated endless screw, wherein said at least one rotatable heated endless screw is in a substantially hermetically sealed heatable chamber of a pyrolysis reactor, and wherein said rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw,
- heating said organic material with said rotatable heated endless screw in said chamber at a temperature of 300°C to 400°C to pyrolyze said organic material as said organic material moves through said heatable chamber under the influence of rotation of said at least one screw, and
- removing the consumed organic material and recovering the produced smoke from the other end of said at least one screw.

19. A process for the production of a smoke product obtained by pyrolysis of an organic material, wherein said process comprises the steps of:

- introducing said organic material to be pyrolyzed at one end of at least one rotatable heated endless screw, wherein said at least one rotatable heated endless screw is in a substantially hermetically sealed heatable chamber of a pyrolysis reactor, and wherein said rotatable heated endless screw comprises an electrical heating device that passes electric current through the rotatable heated endless screw,
- heating said organic material with said rotatable heated endless screw in said chamber at a temperature of 300°C to 400°C as said organic material moves through the substantially hermetically sealed heatable chamber under the influence of rotation of said at least one screw,
- recovering a smoke product from the pyrolyzed organic material, wherein said smoke product is a liquid smoke comprising a volume content of benzopyrene of at most 10 ppb and a volume content of benzoanthracene of at most 20 ppb, and
- removing the consumed organic material from the other end of said at least one screw.

20. The process according to claim 19, wherein the organic material is dried by preheating before being pyrolyzed.

21. The process according to claim 19, wherein the produced smoke is condensed at the outlet of the reactor in a suitable condensation device.

22. The process according to claim 19, wherein at least one portion of the pyrolysis gas present at the outlet of the condensation device is re-injected into the reactor.

23. The process according to claim 19, wherein the pyrolysis takes place under precise control, to about 0.1%, of the volume content of oxygen in the reactor.

24. The process according to claim 19, wherein the organic material is wood chips.

(ix) **Evidence Appendix**

None.

(x) **Related Proceedings Appendix**

None.